

Amendments to the Claims

Please amend the claims according to the following listing of the claims.

1. (Currently amended) A method for making a modified epoxy, comprising the steps of:
 - a) ~~mixing solvents and clay particles of a dimension in the nanometer range, to form~~ preparing a clay solution comprising clay particles of a dimension in the nanometer range and agglomerates of clay particles;
 - b) generating a flow of clay solution and submitting said flow to: (1) high pressure to generate high velocity and to allow shearing in the clay solution to occur; (2) a region of obstacles allowing the agglomerates of clay particles to be broken down; and (3) a sudden lower pressure, yielding a dispersed clay solution having a fine and homogeneous distribution of clay particles of a dimension in the nanometer range in the clay solution; and
 - c) mixing the dispersed clay solution with at least a pristine epoxy.
2. (Cancelled)
3. (Previously Presented) The method according to claim 1, wherein said step a) comprises incorporating a first part of the pristine epoxy and said step c) comprises mixing the dispersed clay particles solution with a remaining part of the pristine epoxy.
4. (Original) The method according to claim 1, wherein said step a) comprises mixing with at least one of mechanical and ultrasonic mixing.
5. (Original) The method according to claim 1, wherein said step b) comprises submitting the clay solution to a pressure of about 20,000 psi in tubes of a diameter of about 0.1 mm.

6. (Original) The method according to claim 1, wherein said step b) comprises exfoliating the clay particles in the solution.
7. (Currently amended) The method according to claim 1, wherein said step c) comprises ~~mixing the dispersed clay particle solution with the pristine epoxy and~~ adding curing agents to yield a solid epoxy material.
8. (Original) The method according to claim 1, whereby the modified epoxy comprises agglomerates of less than about 1 μm and agglomerates of a maximum diameter comprised between about 1 μm and 2 μm .
9. (Currently amended) The method according to claim 1, whereby the modified epoxy has enhanced viscoelastic properties, and improved fracture toughness, ~~and critical strain energy release rate~~ compared to the pristine epoxy.
10. (Previously Presented) The method according to claim 9, whereby the modified epoxy has an increase in K_{1C} and G_{1C} of up to 2 and 3 times respectively with respect to the pristine epoxy, at about 1 wt % of clay loading.
11. (Original) The method according to claim 1, whereby the modified epoxy has enhanced barrier properties, including water absorption resistance, adhesion strength and flammability resistance, with respect to the pristine epoxy.
12. (Original) The method according to claim 1, wherein a mixture of clay and epoxy obtained has a stability over an extended period of time.
13. (Original) The method according to claim 1, wherein the pristine epoxy is a rubber-modified epoxy resin.
- 14 – 19. (Cancelled)
20. (Currently amended) A modified epoxy produced from a pristine epoxy, the modified epoxy having at least higher barrier properties and thermal resistance, a higher critical stress intensity factor (K_{1C}), and a higher

critical strain energy release rate (G_{1C}) than the pristine epoxy, the modified epoxy produced by :

- a) ~~mixing solvents and clay particles of a dimension in the nanometer range, to form~~ preparing a clay solution, comprising clay particles of a dimension in the nanometer range and agglomerates of clay particles forming in the clay solution;
- b) generating a flow of clay solution and submitting said flow to: (1) high pressure; (2) high velocity and breaking impacts in a region of obstacles to allow the agglomerates to be broken down; ~~and to~~ (3) a sudden lower pressure, yielding a dispersed clay solution having a fine and homogeneous distribution of clay particles of a dimension in the nanometer range in the clay solution; and
- c) mixing the dispersed clay solution with at least part of the pristine epoxy, wherein a rubber material is optionally provided with the pristine epoxy during mixing;

wherein a content of about 1% of clay loading and no optional rubber yields an increase in K_{1C} and G_{1C} of up to 2 and 3 times respectively, with respect to the pristine epoxy.

- 21. (Original) The modified epoxy according to claim 20, comprising finely dispersed clay agglomerates of less than about 1 μm and agglomerates of a maximum diameter between about 1 μm and 2 μm .
- 22. (Cancelled)
- 23. (Currently Amended) The modified epoxy according to claim 21, wherein ~~said pristine epoxy is a rubber-modified epoxy~~ the optional rubber is provided with the pristine epoxy during mixing.
- 24. (Original) The modified epoxy according to claim 21, further comprising additives.
- 25. (Cancelled)

26. (Currently amended) The modified epoxy according to claim 23, wherein the modified epoxy has optional rubber is CTBN, and a content of 6 phr of clay loading and 20 phr of CTBN yields an increase in K_{1C} and G_{1C} of up to 2.2 and 7.6 times respectively at 6-phr organoclay loading and 20-phr CTBN compared with respect to the pristine epoxy.
27. (Previously Presented) The method according to claim 13, wherein the modified epoxy has an increase in K_{1C} and G_{1C} of up to 2.2 and 7.6 times respectively at 6-phr organoclay loading and 20-phr CTBN compared with the pristine epoxy.
28. (Withdrawn) A composite epoxy comprising clay agglomerates of less than about 1 μm and clay agglomerates of a maximum diameter comprised between about 1 μm and 2 μm in a pristine epoxy.
29. (Withdrawn) The composite epoxy according to claim 28, said composite epoxy having an increase in K_{1C} and G_{1C} of up to 2 and 3 times respectively with respect to the pristine epoxy, at about 1 wt % of clay loading.
30. (Withdrawn) The composite epoxy according to claim 28, said composite epoxy having an increase in K_{1C} and G_{1C} of up to 2.2 and 7.6 times respectively at 6-phr organoclay loading and 20-phr CTBN compared with the pristine epoxy.
31. (Withdrawn) The composite epoxy according to claim 28, wherein said pristine epoxy is a rubber-modified epoxy resin.
32. (Withdrawn) The composite epoxy according to claim 28, wherein said pristine epoxy is a rubber-modified epoxy resin, the composite epoxy having an increase in K_{1C} and G_{1C} of up to 2.2 and 7.6 times respectively at 6-phr organoclay loading and 20-phr CTBN compared with the pristine epoxy.

33. (New) A modified epoxy produced from a pristine epoxy, the modified epoxy having at least a higher flammability resistance and a higher fracture toughness than the pristine epoxy, the modified epoxy produced by :
- a) preparing a clay solution comprising comprising clay particles of a dimension in the nanometer range and agglomerates of clay particles;
 - b) generating a flow of clay solution and submitting said flow to: (1) high pressure; (2) high velocity and breaking impacts in a region of obstacles to allow the agglomerates to be broken down; and (3) a sudden lower pressure, yielding a dispersed clay solution having a fine and homogeneous distribution of clay particles of a dimension in the nanometer range in the clay solution; and
 - c) mixing the dispersed clay solution with at least part of the pristine epoxy;
- wherein a content of as low as about 4 phr of clay loading yields an increase in critical strain energy release rate (G_{1C}) of at least 4.8 times with respect to the pristine epoxy.
34. (New) The modified epoxy of claim 33, wherein said step c) comprises adding agents to yield a solid epoxy material.

35. (New). A modified epoxy produced from a rubber-modified pristine epoxy, the modified epoxy having at least a higher flammability resistance and a higher fracture toughness than the rubber-modified pristine epoxy, the modified epoxy produced by :

- a) forming a clay solution comprising comprising clay particles of a dimension in the nanometer range and agglomerates of clay particles;
- b) generating a flow of clay solution and submitting said flow to: (1) high pressure; (2) high velocity and breaking impacts in a region of obstacles to allow the agglomerates to be broken down; and (3) a sudden lower pressure, yielding a dispersed clay solution having a fine and homogeneous distribution of clay particles of a dimension in the nanometer range in the clay solution; and
- c) mixing the dispersed clay solution with at least part of the rubber-modified pristine epoxy;

the modified epoxy having, at about 20 phr of CTBN rubber and as low as about 4 phr clay loading, an increase in critical strain energy release rate (G_{1C}) of at least 6 times compared to the rubber-modified pristine epoxy.

36. (New) The modified epoxy of claim 35, wherein said step c) comprises adding curing agents to yield a solid epoxy material.

37. (New) The modified epoxy of claim 20, wherein said step c) comprises adding curing agents to yield a solid epoxy material.